CMA Testing and Certification Laboratories
廠商會檢定中心

TEST REPORT

Report No. : AU0049569(0) Date : 05 Aug 2016

Application No. : LU024643(8)

Applicant : SHENZHEN QIAOHUA INDUSTRIES LIMITED
Qiaohua Industrial Zone, Luo Tian Forestry Center, Song Gang Town, Bao An District, Shenzhen, China, 518105

Sample Description : One(1) item of submitted sample stated to be:

Sample Description	Model number
433MHz Wireless Transmitter	4900333 / 041617 / 393007N / QH-9811 / QH-L / QH- M / QH- V / QH- A / QH- E / QH- X / QH- K / QH- I / QH- Q / QH- B / QH- D / QH-N / QH-G / QH-C / QH-F / QH-H / QH-J / QH-O / QH-S / QH-T / QH-U / QH-W / QH-Y / QK-M1 / QK-M2 / QK-P1 / QK-P2 / QK-P3 / QK-P4 / QK-P5 / QK-P6 / QK-R1 / QK-A1 / WD-001 / WD-002 / WD-003 / WD-007 / WD-008 / WD-009 / BD-009 / BD-010 / BD-011 / BD-012

Sample registration No. : RU034543-001
Radio Frequency : 433.92 MHz Transmitter
Rating : 1 x 3V button cell
No. of submitted sample : Two (2) set (s)

Date Received : 13 Jul 2016
Test Period : 18 Jul 2016 to 25 Jul 2016.

Test Requested : FCC Part 15 Certificate (15.231)

Test Method : 47 CFR Part 15 (10-1-15 Edition), ANSI C63.10 – 2013

Test Engineer : Mr. LEUNG Shu-kan, Ken

Test Result : See attached sheet(s) from page 2 to 27.

Conclusion : The submitted sample was found to comply with requirement of FCC Part 15 Subpart C.

Remark : All Forty-seven models are same in circuitry and components and construction, and therefore model QH-A was chosen to be representative of the test sample. The difference(s) between the tested model and the declared model(s) is/are Model no., and Outlook.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____ Page 1 of 27

Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

FCC ID: 2AAV8QH-912-2T

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1 General Information

1.1 General Description

The equipment under test (EUT) is a door bell transmitter. It operates at 433.95MHz and the oscillation of MCU is generated by an oscillator. The EUT is power by 1 x 3V button cell. The MCU will generate. It will transmit the measured data to receiver wirelessly.

The brief circuit description is listed as follows:

- IC1 and its associated circuit act as MCU
- SAW and its associated circuit act as oscillator
- Q1, Q2 and its associated circuit act as RF circuit

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1.2 Location of the test site

FCC Registered Test Site Number: 552221

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. A shielded room is located at :

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
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New Territories,
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1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	R&S	ESCI	100152	27 Sep 2016	1Year
Spectrum Analyzer	R&S	FSV40	100628	09 Feb 2017	1Year
Broadband Antenna	Schaffner	CBL6112B	2718	15 Mar 2017	2Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2018	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	24 Nov 2016	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	24 Nov 2016	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	18 May 2017	1Years
Coaxial Cable	Suhner	RG 214/U	N/A	18 May 2017	1Years
Coaxial Cable	Suhner	Sucoflex_104	N/A	13 Dec 2016	1Years

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1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Radiated emissions

Frequency	Uncertainty (U_{lab})
30MHz ~ 200MHz (Horizontal)	4.83dB
30MHz ~ 200MHz (Vertical)	4.84dB
200MHz ~1000MHz (Horizontal)	4.87dB
200MHz ~1000MHz (Vertical)	5.94dB
1GHz ~6GHz	4.41dB
6GHz ~18GHz	4.64dB

Conducted emissions

Frequency	Uncertainty (U_{lab})
150kHz~30MHz	2.64dB

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2 Description of the radiated emission test

2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013.

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 1m and 0.8m high above the ground for below 1GHz measurement and 1.5m high above the ground for above 1GHz measurement. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

For 30MHz to 1GHz, broadband antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. And the reference point of antenna shall be 1 m above the ground.

For above 1GHz, horn antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. Preamplifier and High Pass filter was used for measurements. The reference point of antenna shall be 1 m above the ground.

The device was rotated through three orthogonal to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.

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2.2 Test Result

Peak Detector data were measured unless otherwise stated.

"#" means emissions appear within the restricted bands shall follow the requirement of section 15.205.

The frequencies from fundamental up to that tenth harmonics were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next page (section 2.3).

It was found that the EUT meet the FCC requirement.

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2.3 Radiated Emission Measurement Data

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	25	° C
Relative humidity:	60	%

Measurement: Peak Operation mode: Transmission
RBW: 9kHz (below 30MHz), 120kHz (30MHz-1GHz), 1MHz (above 1GHz)
VBW: 30kHz (below 30MHz), 300kHz (30MHz-1GHz), 3MHz (above 1GHz)
Testing frequency range: 9kHz to 4.5GHz

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBµV)	Transducer Factor (dB/m)	Field Strength at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
433.946	H	61.7	20.6	82.3	100.8	- 18.5
867.888	H	29.0	24.7	53.7	80.8	- 27.1
#1301.790	H	48.9	- 7.7	41.2	74.0	- 32.8
1735.744	H	42.5	- 7.8	34.7	80.8	- 46.1
2169.665	H	39.4	- 6.6	32.8	80.8	- 48.0
2603.583	H	41.5	- 6.6	34.9	80.8	- 45.9

Remark: Other emissions more than 20dB below the limit are not reported.

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2.3 Radiated Emission Measurement Data (Con't)

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	25	° C
Relative humidity:	60	%

Measurement: Average Operation mode: Transmission
Testing frequency range: 9kHz to 4.5GHz

Frequency (MHz)	Polarity (H/V)	Peak Field Strength at 3m (dBμV/m)	Average Factor (dB/m)	Average Value at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
433.946	H	82.3	- 16.7	65.6	80.8	- 15.1
867.888	H	53.7	- 16.7	37.0	60.8	- 23.8
#1301.790	H	41.2	- 16.7	24.5	54.0	- 29.5
1735.744	H	34.7	- 16.7	18.0	60.8	- 42.8
2169.665	H	32.8	- 16.7	16.1	60.8	- 44.7
2603.583	H	34.9	- 16.7	18.2	60.8	- 42.6

Remark: Other emissions more than 20dB below the limit are not reported.

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3 Description of the Line-conducted Test

3.1 Test Procedure

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

No measurement is required as the EUT is a battery-operated product.

3.3 Graph and Table of Conducted Emission Measurement Data

Not Applicable

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4 Photograph

4.1 Photographs of the Test Setup for Radiated Emission and Conducted Emission

For electronic filing, the photos are saved with filename 2AAV8QH-912-2T TSup.pdf.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename 2AAV8QH-912-2T ExPho.pdf and 2AAV8QH-912-2T InPho.pdf.

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5 Supplementary document

The following document were submitted by applicant, and for electronic filing, the document are saved with the following filenames:

Document	Filename
ID Label/Location	LabelSmp.jpg
Block Diagram	BlkDia.pdf
Schematic Diagram	Schem.pdf
Users Manual	UserMan.pdf
Operational Description	OpDes.pdf

5.1 Bandwidth

The plot saved in Appendices A5 shows the fundamental emission is confined in the specified band. The bandwidth requirement is 0.25% x 433.95 = 1.085MHz

5.2 Duty cycle Calculation

Appendices A6 shows the plots of duty cycle

The pulse train is over 100ms, therefore need to find the 100ms period with most 'ON' time.

During these 100ms, there are three complete pulse trains with few additional pulses.

There are 2 different pulses in one pulse train

Time of pulse one: 300µs
Time of pulse two: 1.05ms

Number of pulse one in 100ms: 10
Number of pulse two in 100ms: 11

Duty cycle = (10*300µs + 11*1.05ms) / 100ms = 0.1455

Average factor = 20*log(0.1455) = -16.7

5.3 Transmission Time

During of each transmission = 2.23s.

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A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released according to section 15.231(a). The plot saved Appendices A7 shows the EUT met the FCC requirement.

5.4 Antenna requirement

Appendices A3 shows the antenna is permanently attached and cannot be changed. Therefore it fulfils the section 15.203 requirement

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6 Appendices

A1	Photos of the set-up of Radiated Emissions	2	pages
A2	Photos of External Configurations	2	pages
A3	Photos of Internal Configurations	2	pages
A4	ID Label/Location	1	page
A5	20dB Bandwidth Plot	1	page
A6	Average Factor	3	pages
A7	Transmission Time	1	page

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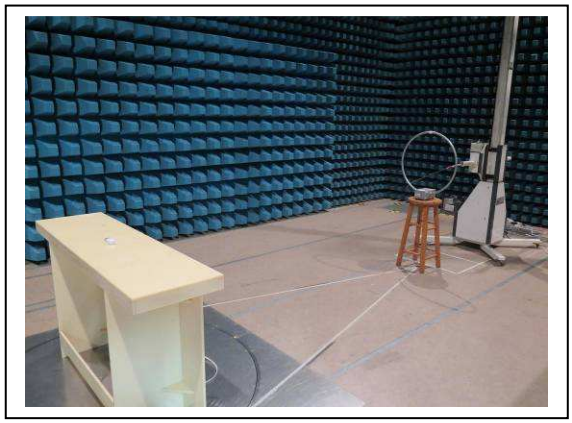
A1. Photos of the set-up of Radiated Emissions

30Hz – 1GHz



9kHz – 30MHz

Tested by: Mr. LEUNG Shu-kan, Ken

Reviewed by: Mr. WONG Lap-pong, Andrew

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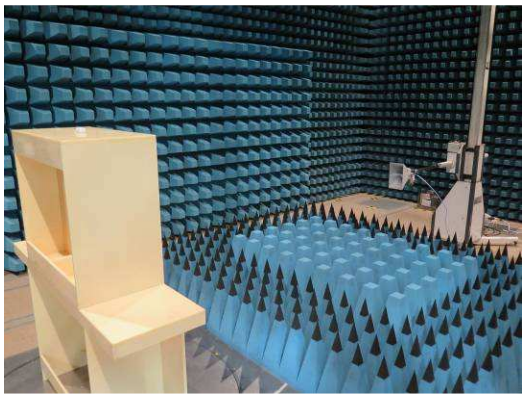
A1. Photos of the set-up of Radiated Emissions



1GHz – 5GHz

Tested by: Mr. LEUNG Shu-kan, Ken

Reviewed by: Mr. WONG Lap-pong, Andrew

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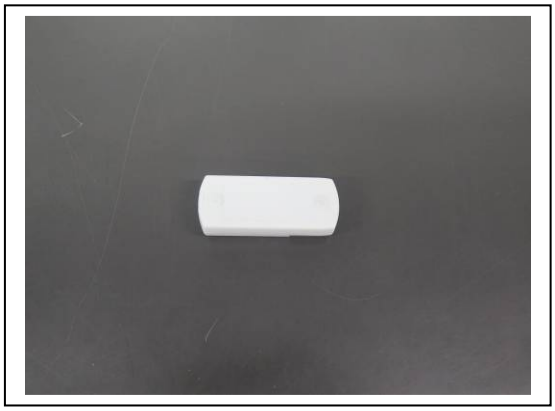
A2 Photos of External Configurations

External Configuration 1



External Configuration 2

Tested by: Mr. LEUNG Shu-kan, Ken

Reviewed by: Mr. WONG Lap-pong, Andrew

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A2 Photos of External Configurations

External Configuration 3

External Configuration 4

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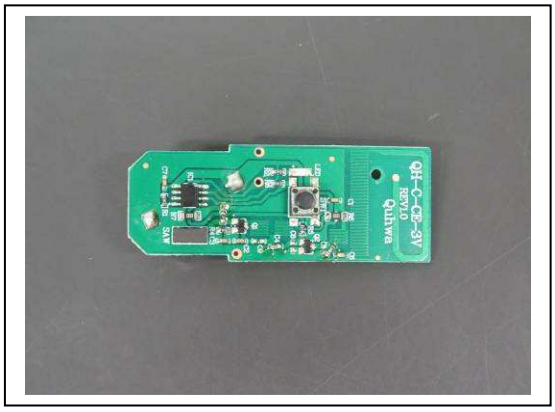
A3 Photos of Internal Configurations



Internal Configuration 1

Internal Configuration 2

Tested by: Mr. LEUNG Shu-kan, Ken

Reviewed by: Mr. WONG Lap-pong, Andrew

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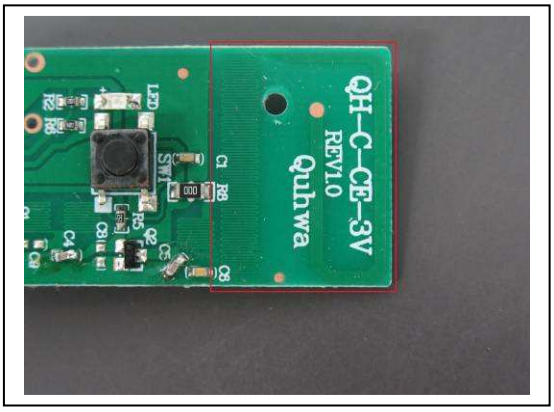
A3 Photos of Internal Configurations



EUT Antenna

Tested by: Mr. LEUNG Shu-kan, Ken

Reviewed by: Mr. WONG Lap-pong, Andrew

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A4. ID Label / Location

ID Label

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Reviewed by: Mr. WONG Lap-pong, Andrew

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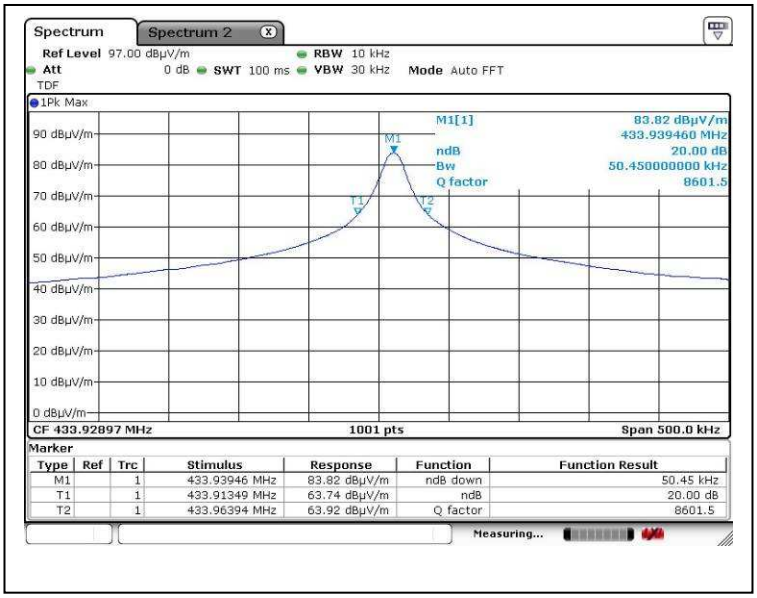
A5. 20dB Bandwidth Plot



Tested by: Mr. LEUNG Shu-kan, Ken

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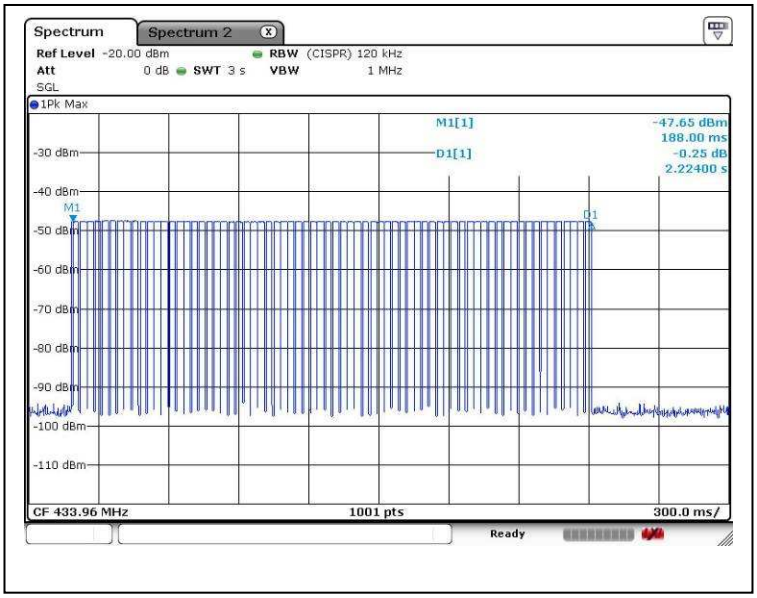
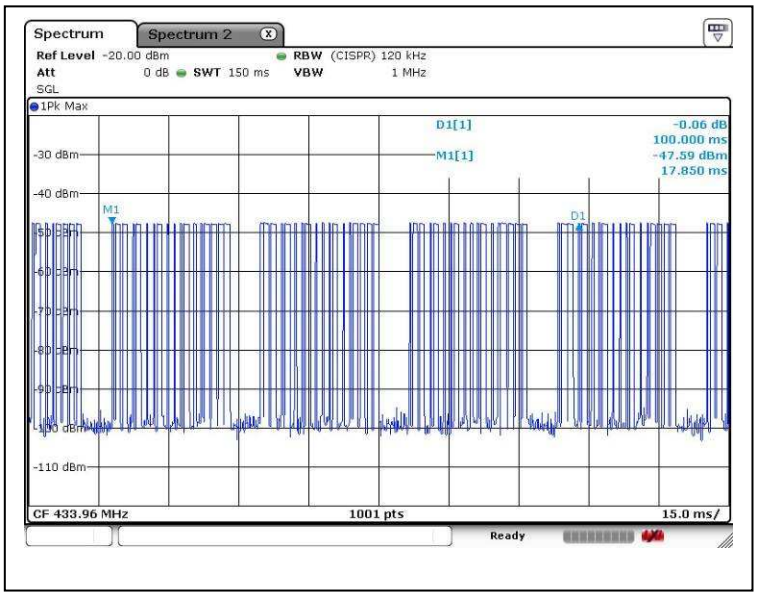
A6. Average Factor





Tested by: Mr. LEUNG Shu-kan, Ken

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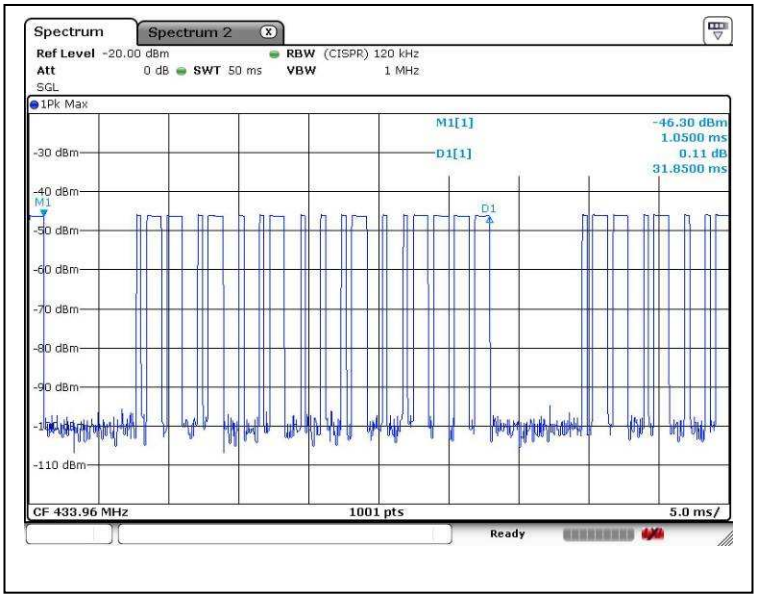
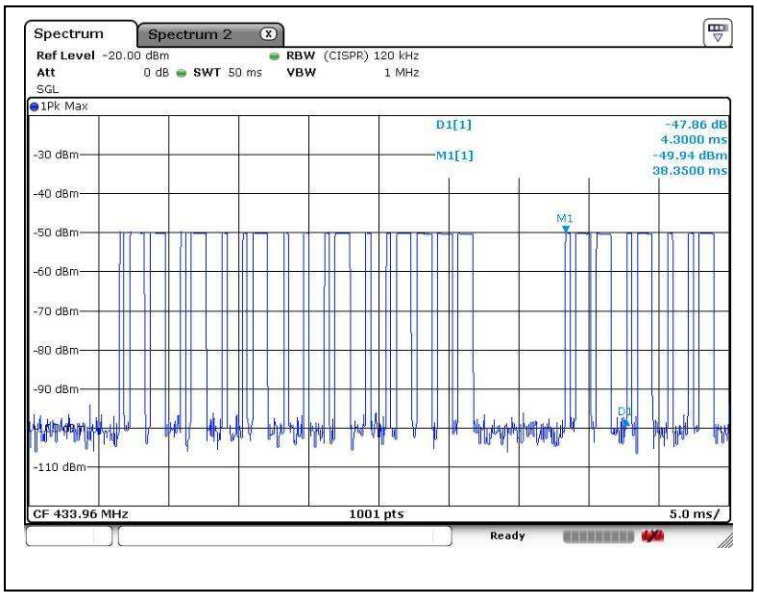
A6. Average Factor





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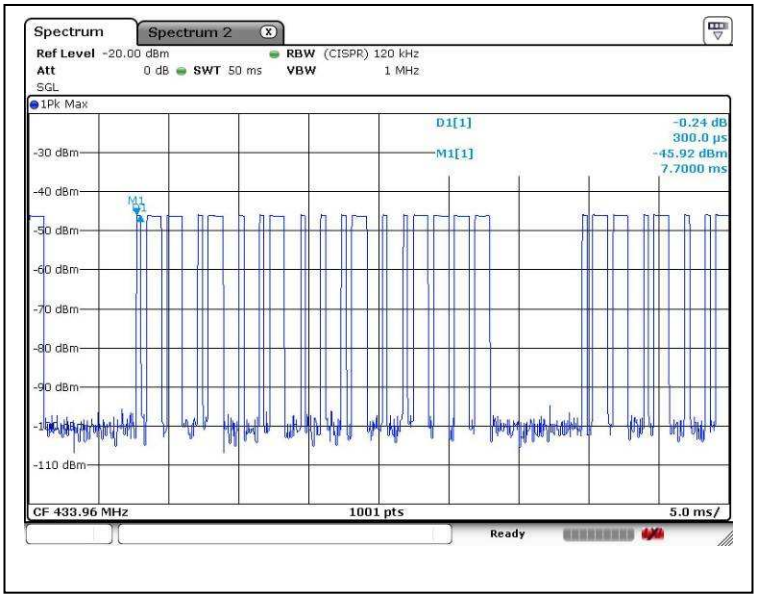

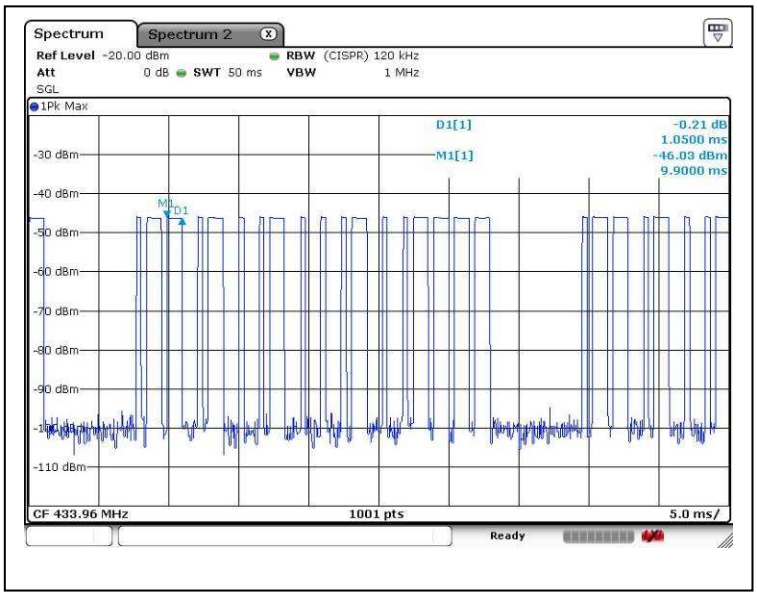

Tested by: Reviewed by:

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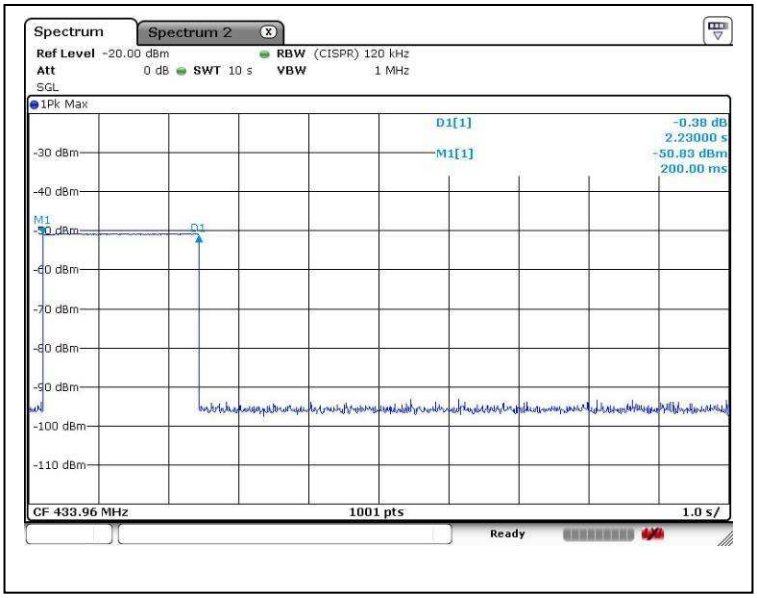
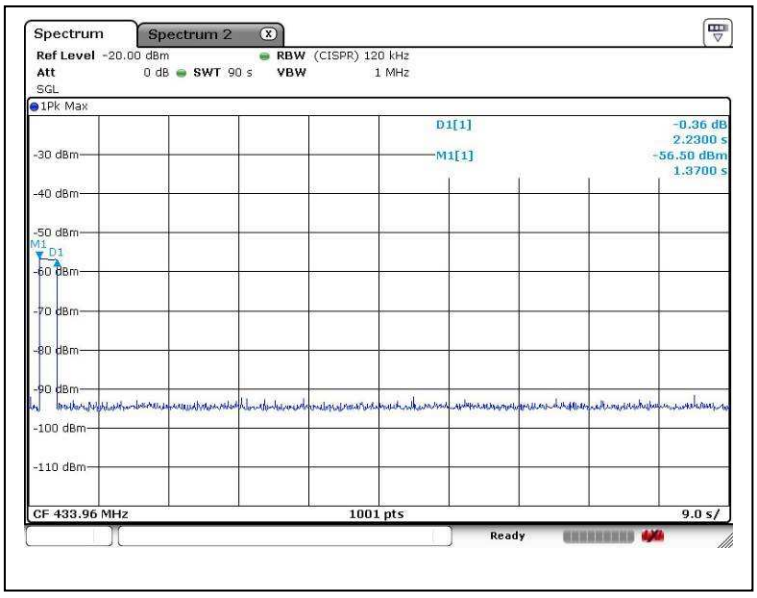
TEST REPORT

Report No. : AU0049569(0) Date : 05 Aug 2016

A7. Transmission Time





***** End of Report *****

Tested by: Mr. LEUNG Shu-kan, Ken

Reviewed by: Mr. WONG Lap-pong, Andrew

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